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AUTHOR Kirby, Peggy C.; And Others
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ABSTRACT

A survey of computer usage in 179 randomly selected public elementary and secondary schools in Louisiana was conducted in the spring of 1988. School principals responded to questions about school size, the socioeconomic status of the student population, the number of teachers certified in computer literacy and computer science, and the number of teachers who received inservice training in computer usage. Key computer-using teachers answered more specific questions about resources, personnel, location of computers, funding sources, and access by various student groups. A comparison of the available resources to the national average in 1985 indicated a lag in the acquisition of equipment. The mean number of computers per school was found to be 21.5 with a range of 1 to 99; roughly half of the computers were Apples or Apple compatible. Most schools owned peripherals such as printers and color monitors, but input devices such as light pens, joysticks, and "mice" were uncommon. The most common computer software resources were word processing, tutorial, and drill and practice packages. The primary sources of funding were vocational education on the secondary level and special education at the elementary level. Most of the computers were located in learning laboratories or in special or vocational education classrooms and departments, with regular students having little access to these computers unless they participated in a computer course offered in the lab. Certified teachers in computer literacy and computer science were scarce in both settings. (4 figures and 8 tables; 4 references) (EW)

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Survey of Computer Usage in Louisiana Schools

Peggy C. Kirby
Dave Wilson
Karen Smith-Gratto

University of New Orleans

Factors that determine the success or failure of computers in the curriculum include the availability of quality hardware and courseware as well as adequate staff development and commitment to computer implementation (Hasselbring, 1984; Becker, 1985). While national surveys such as the annual one conducted by Becker describe the typical classroom scenario, the picture varies from state to state, district to district, and even within large school districts. A problem often concealed by such descriptive research is the differential impact of computer technology on sub-groups of students.

This study describes the state of computer usage in one southern state. A survey of 179 randomly selected elementary and secondary public schools was conducted in the Spring of 1988. The school principal responded to questions about school size, socioeconomic status (SES) of the student population, the number of teachers certified in computer literacy and computer science, and the number of teachers who had received in-service training in computer usage. A key computer-using teacher was designated to answer more specific questions concerning resources, personnel, location of computers, funding sources, and access by various student groups.

Sample

Of the schools responding to the questionnaire, 50 were classified as elementary, usually including kindergarten through fifth or sixth grade, and 129 were classified as secondary. The secondary classification included all middle, junior, and senior high schools. The many different configurations of secondary schools in the state (6-8, 7-9, 7-12, 9-12, 10-12) precluded more in-depth analysis by level.

The average student enrollment at the elementary level was 550 students with a range of 132 to 1800. Secondary schools had similar average enrollments, 576 students with a

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range of 117 to 1800. The number of teachers per school ranged from 11 to 108 (M=28.5) at the elementary level and from 6 to 90 at the secondary level (M=34.7). Characteristics of the sample are presented in Table 1.

Technological Resources

Available resources compared to national averages of 1985 indicating a lag in acquisition of equipment. The mean number of computers per school was 21.5 (see Table 2) with a range of 0 to 99. Elementary schools averaged 10.8 units while secondary schools averaged more than 25 units. Four percent of the elementary and two percent of the secondary schools owned no computers.

Roughly half (49.5%) of the available computers were Apple or Apple compatible. IBM and compatibles accounted for 24 percent of the market. Approximately 18 percent were Tandy computers. Commodore, Atari, and other less popular brands comprised about 8 percent of the market share (see Figure 1). The average number of units by brand for elementary and secondary schools is presented in Figure 2. High schools averaged about 12 Apple or Apple clones and 5 IBM or IBM clones. Elementary schools averaged about five Apple/Apple compatibles and four IBM/IBM compatibles. Tandy computers were popular only in the senior high schools with about five units in each.

Most schools owned peripherals such as printers and color monitors. Less than half of the schools owned computers with fixed disks. Input devices such as light pens, joysticks, and "mice" were uncommon at both levels. No elementary and only about 20 percent of the secondary schools owned modems, an indication that very few schools had access to external data bases. Availability of select peripherals are graphically represented in Figure 3.

The most common software resources were word processing, tutorial and drill and practice packages (see Figure 4). Secondary schools also tended to own data base systems, graphic packages, and business software. While elementary schools owned primarily instructional software (tutorials, and drill and practice), more secondary schools also owned applications software (data bases, statistics packages, graphics, business applications, and word processing).

Respondents were asked to indicate the sources of funds

used to purchase computers and related equipment. The primary source of funds was vocational education in the secondary schools and special education in the elementary schools. Overall, vocational education funds were indicated as the primary source in 37.9 percent of the schools and Chapter I and II funds were indicated as the primary source in 29.6 percent of the schools. As graphically depicted in Figure 5, 67 percent of the schools reported that these were the two primary sources of computer funds. Of most interest here is the fact that these computers were purchased for specific sub-groups of students and not for general use. In fact, many of these computers are dedicated only for use by these sub-groups. The regular classroom student may, therefore, have limited access to computer usage in many schools. This hypothesis is later supported by the reported usage of computers by specific student groups.

Personnel

Certified teachers in computer literacy and computer science were scarce in both settings. Seventy-five percent of the elementary schools had no teacher certified in computer literacy. Only two had a certified computer science teacher. Although computer literacy is now a degree requirement in the state, 16.5 percent of the secondary schools had no teacher certified in that area; 58.3 percent had no certified computer science teachers (see Figure 6).

In the elementary schools, an average of five teachers used computers for instructional purposes at least twice per week. Less than two elementary teachers, on average, used computers for management purposes such as grading and record-keeping. These figures were little better at the secondary level with an average of 3.6 teachers using computers in instruction at least twice per week and three teachers using computers in instructional management.

Respondents were asked to estimate the percentage of teachers in their schools who had received computer training in college courses or in-service workshops. In about three-quarters of all schools, less than ten percent of the teachers were reported to receive any training in the use of computers through college or university course work. At the elementary level, 17.8 percent reported no in-service workshops on the use of computers while four schools reported that all teachers had received in-service training. At the secondary level, 15 percent reported no in-service training while 7.5 percent (9 of 120 schools) reported

training for the entire faculty. In-service computer training was provided for about ten percent of the faculty at the typical school at both levels.

Student Access

Most computers were located in labs, 42.5% at the elementary level and 55.2% at the secondary level (see Figure 7). A large number were located in classrooms for the gifted and talented, special education or Chapter I students. When the number of computers located in department offices are added to these special use computers, it is clear that a large number of computers are unavailable to the "typical" student. Unless these students are able to participate in computer courses offered in the computer lab, they are likely to have very little hands-on exposure.

In fact, the chances of the regular classroom student having access to a computer in school were less than half those of special education and gifted students. It seems that even the computers located in computer laboratories are used by very few students (see Figure 8). At the elementary level, all students classified as gifted and talented were reported to use computers. Just under half of all special education students used computers. Yet only 21.6 percent of the students used computers in the regular classroom. Only 2.3 percent used computers in computer labs even though 42.5% of all computers were located in labs. At the secondary level, the figures are equally alarming. Nearly half of all students classified as gifted (46.7%) or special education (47.4%) used computers while only 13.6 percent of students used computers in the regular classroom and 7.5 percent used computers in labs. Because about 70 percent of the computers were located in labs, special education, or gifted classrooms, it appears that the majority of students have little or no exposure to computers in school.

One alarming finding was the disproportionate number of computers and trained staff in schools of differing socioeconomic (SES) contexts. Unfortunately, the number of computers available in any school was directly related to the percentage of students participating in the free lunch program, a rough indicator of the socioeconomic status of the students' parents. In fact, the correlation between number of students and percentage of students in the free lunch program was -.30 ($p<.0001$). The mean difference in number of computers in low-SES schools (less than 48% of students in free-lunch program) and high-SES schools (more

than 48%) was statistically significant (t=4.8, p<.0001).

At the elementary level, computers were used primarily for drill and practice in reading, mathematics, and English. At the secondary level, they were prevalent in business classes that taught word processing and data processing and in computer classes that emphasized literacy or programming skills (see Tables 3 and 4).

Results of a recent study of computer competence among 3rd, 7th, and 11th grade students revealed that black and Hispanic students had less knowledge of computers because they had less exposure both at home and at school (National Assessment of Educational Progress, 1988). McPhail (1985) suggested that the little time available to students in low SES contexts to interact with computers is often relegated to drill and practice exercises while their more affluent counterparts are more likely to engage in programming and application exercises. Thus the economically disadvantaged student uses the computer as a tool to master skills in other curricular areas while computer literacy skills are mastered by students in higher SES settings.

Summary

In addition to presenting descriptive information about one state's technological resources in education, this research suggests that measures must be taken to redress the growing gap in educational resources available to the economically disadvantaged. Furthermore, computer access varies widely for students within schools as well as from school to school. Special education and gifted students have greater access to computers than regular classroom students. Computers are often located in Chapter 1 and gifted classes thus increasing exposure for these student groups. Thus, students who attend schools in less affluent areas and who are not classified as special needs students appear to be technologically at-risk. This question of access to available resources, particularly for "typical" and low-SES students, must be addressed.

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McPhail, I.P. (1985). Computer inequities in school uses of microcomputers: Policy implications. Journal of Negro Education, 54, 3-13.

National Assessment of Educational Progress. (1988). Computer competence, the first national assessment. Princeton, NJ: Author.

TABLE 1
Sample Characteristics

Students enrolled

	N	$\bar{X}$	SD	Range
Elementary	50	549.6	356.6	132-1800
Secondary	129	576.2	330.6	117-1800

Full-time Teachers

	N	$\bar{X}$	SD	Range
Elementary	50	28.5	16.0	11-108
Secondary	129	34.7	19.3	6-90

TABLE 2
Computer Availability

# per school	Elementary f	%	cum.%	Secondary f	%	cum.%	K-12 f	%	cum.%
0	2	0.04	0.04	2	0.02	0.02	4	0.02	0.02
1-9	22	0.49	0.53	14	0.11	0.13	36	0.21	0.23
10-19	14	0.31	0.84	44	0.35	0.47	58	0.34	0.57
20-29	4	0.09	0.93	24	0.19	0.66	28	0.16	0.73
30-39	2	0.04	0.98	23	0.18	0.84	25	0.15	0.88
40-49	1	0.02	1.00	8	0.06	0.91	9	0.05	0.93
50-59	0	0.00	1.00	7	0.06	0.96	7	0.04	0.97
60-69	0	0.00	1.00	1	0.01	0.97	1	0.01	0.98
70-79	0	0.00	1.00	1	0.01	0.98	1	0.01	0.98
80-89	0	0.00	1.00	0	0.00	0.98	0	0.00	0.98
90-99	0	0.00	1.00	3	0.02	1.00	3	0.02	1.00
	N = 45			N = 127			N = 172		
	$\bar{X}$ =10.82			$\bar{X}$ =25.33			$\bar{X}$ =21.53		
	SD = 9.21			SD =18.77			SD =17.96		

Fig. 1. Market Share by Brand

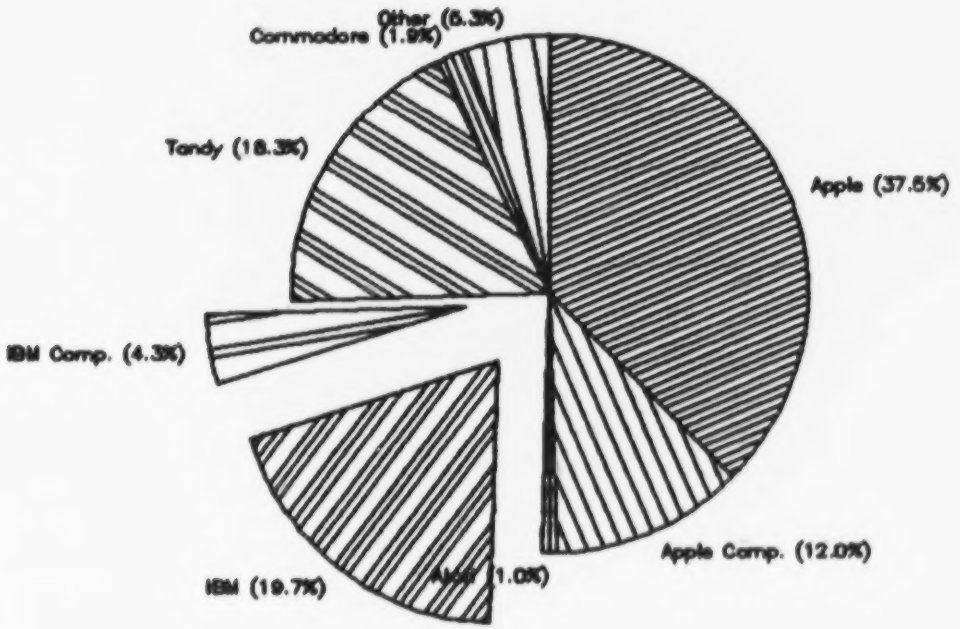


Fig. 2. Comparison by Brand

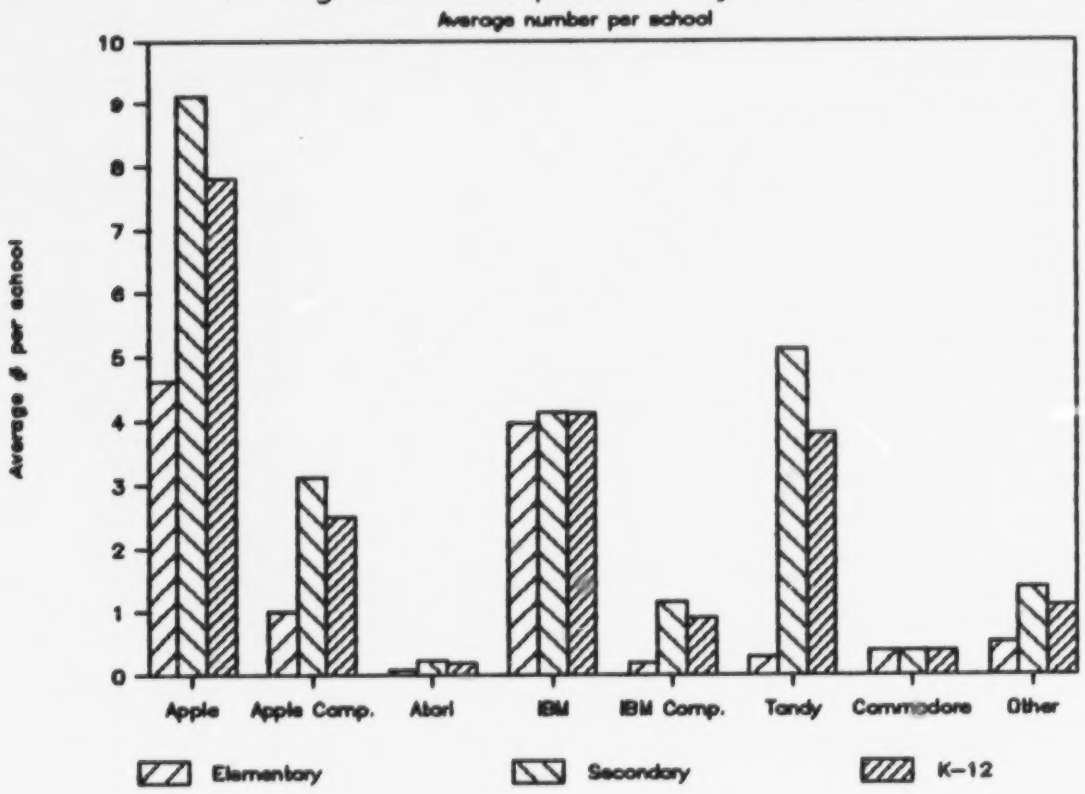


Fig. 3. Hardware Resources

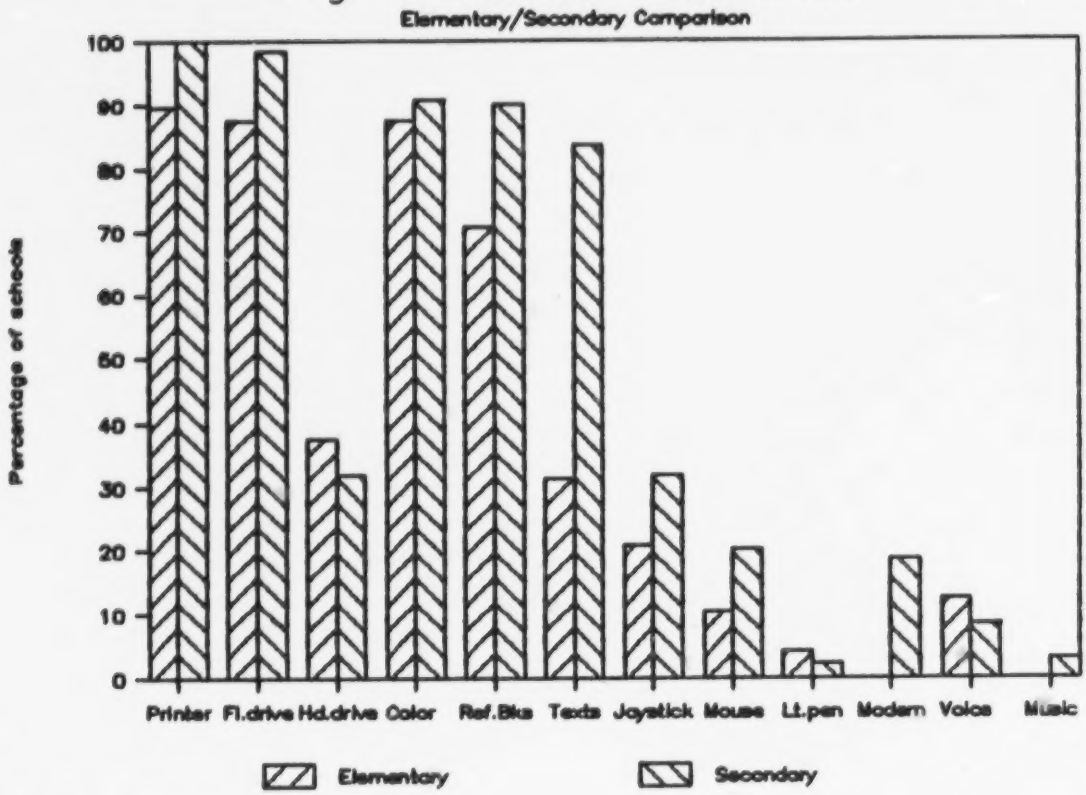


Fig. 4. Software Resources

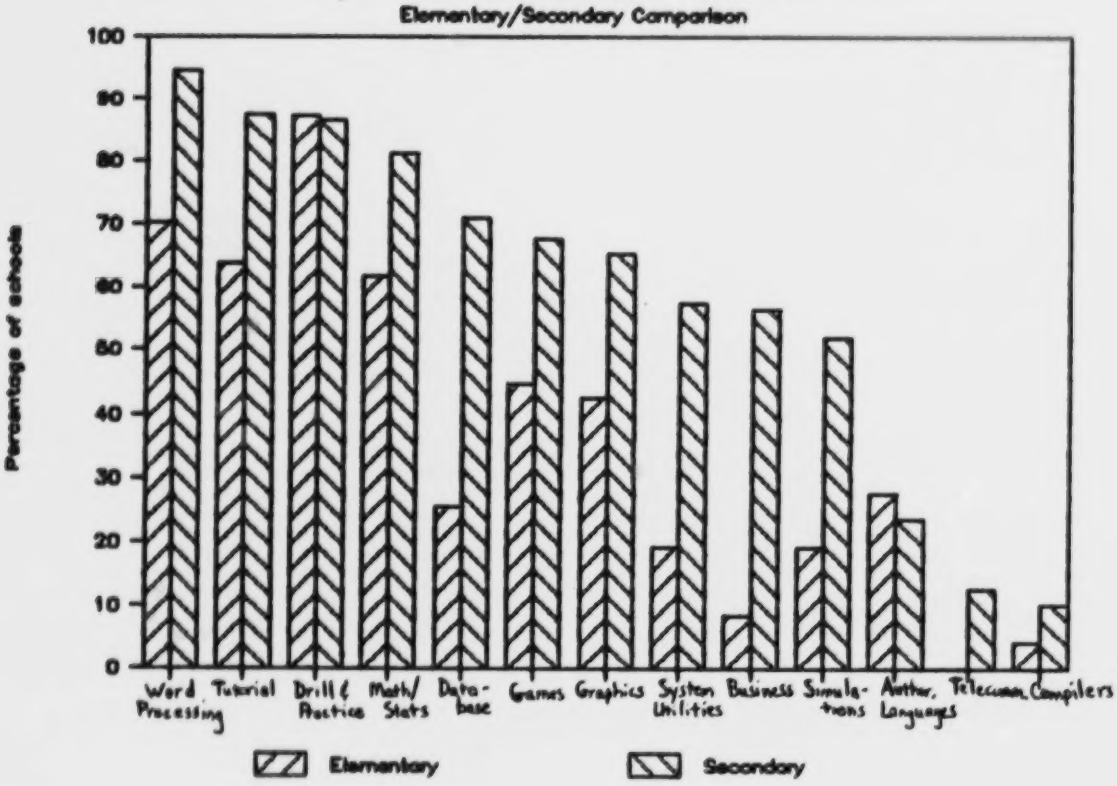


Fig. 5. Sources of Funds

% of schools indicating primary source

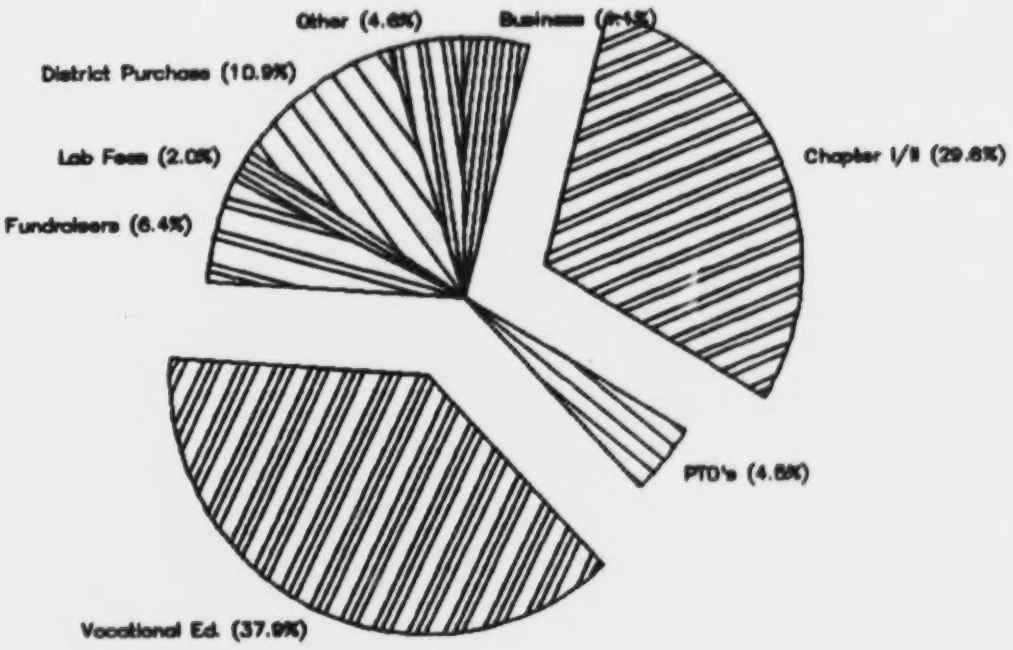
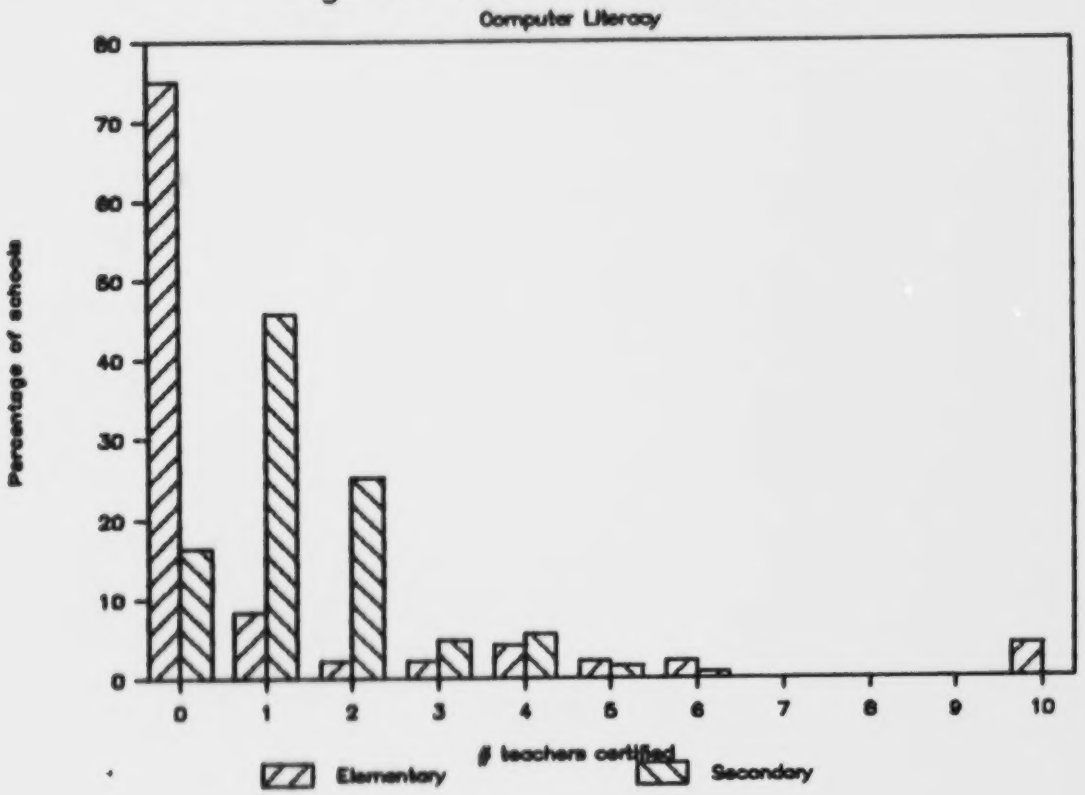


Fig. 6. Teacher Certification



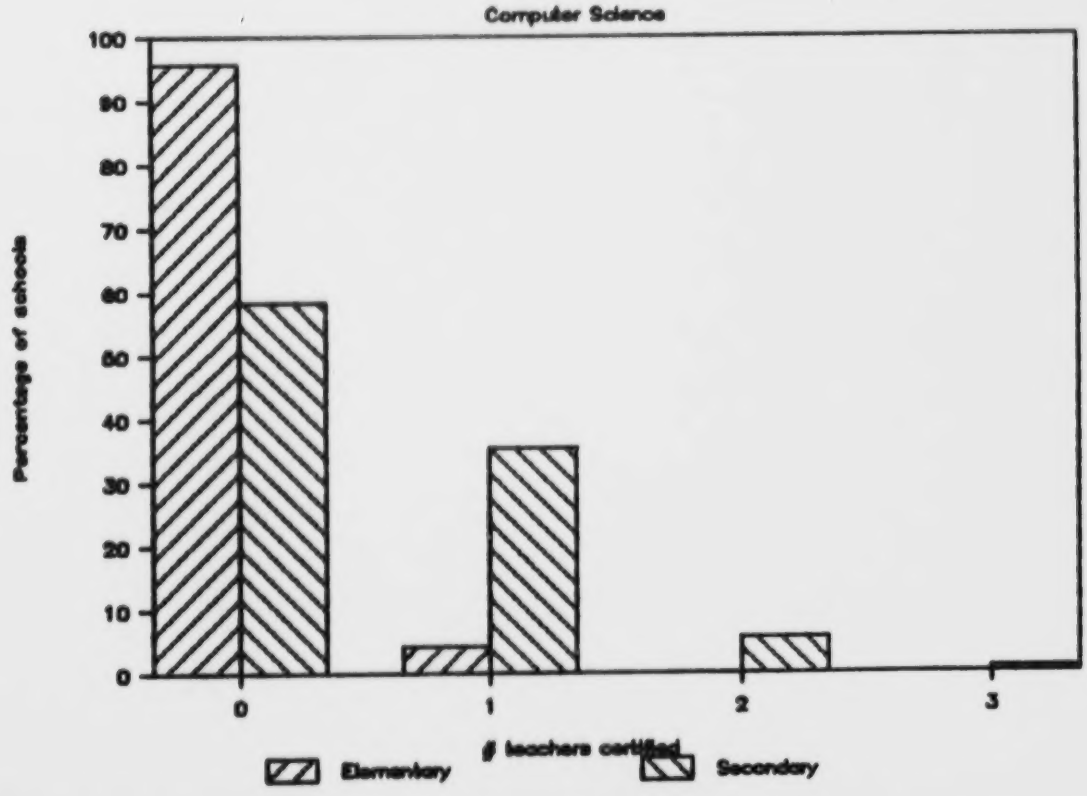
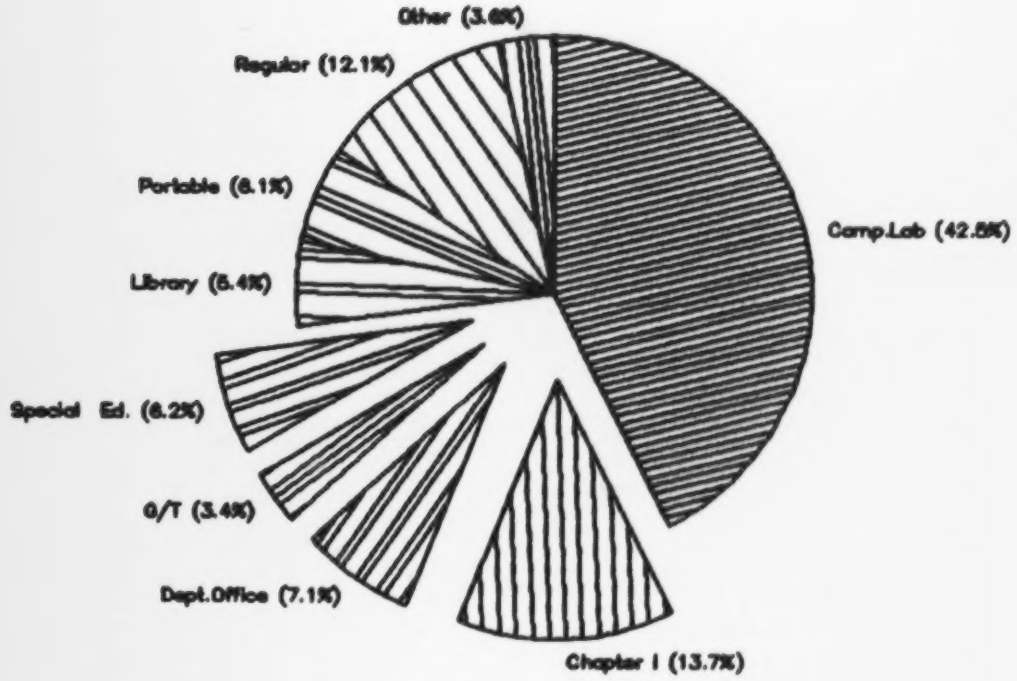


Fig. 7. Location of Computers

Elementary



Secondary

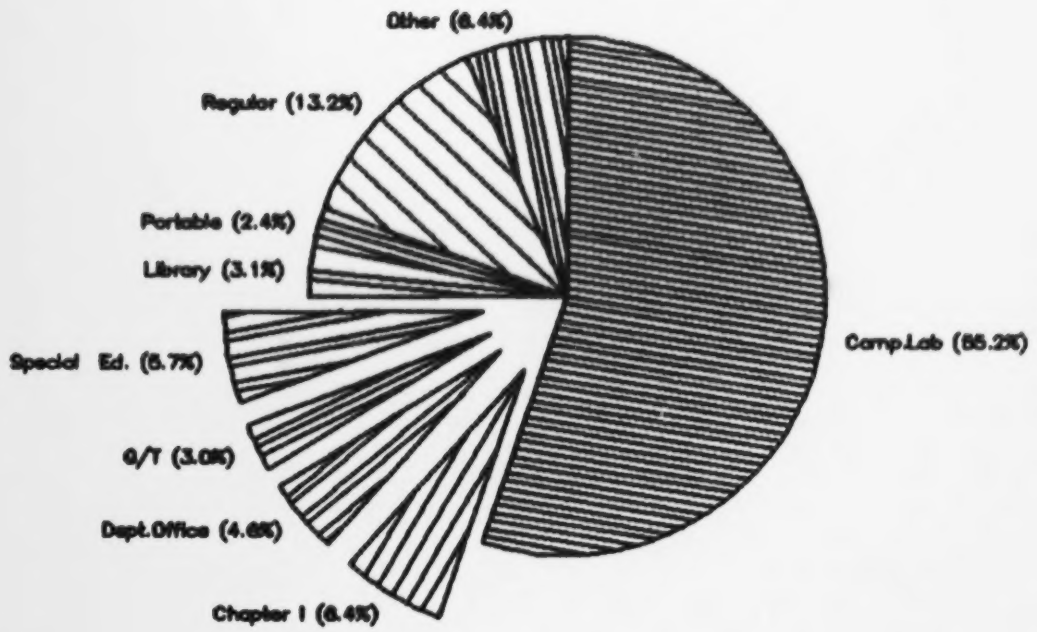


Fig. 8. Student Access

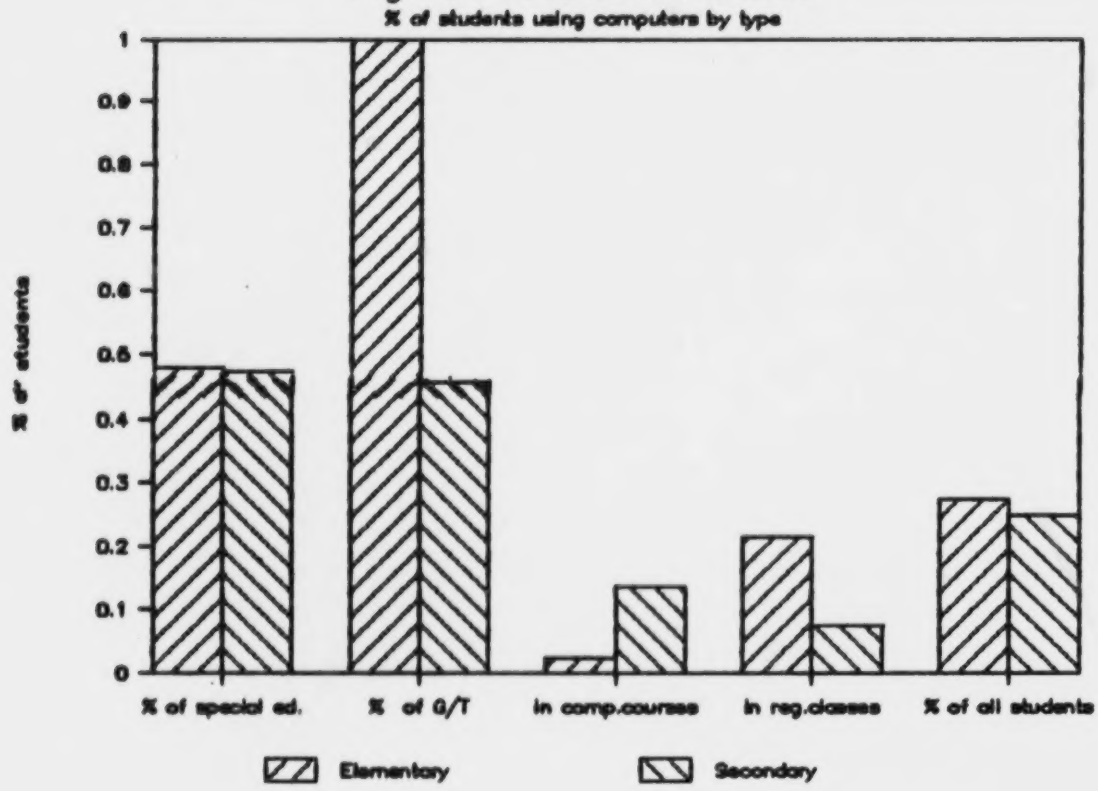


TABLE 3

Subject Areas in Which Computers Are Used

	% schools using in each area		
	Elementary	Secondary	
Reading	85.1	35.2	
Math	78.7	49.2	#3
English	53.2	31.3	
Social Studies	31.9	14.8	
Computer literacy	29.8	78.1	#1
Science	25.5	23.4	
Word Processing	21.3	57.8	#2
Art	6.4	3.9	
Computer science	2.1	41.4	#5
Data processing	2.1	42.2	#4
Home economics	0.0	23.4	
Industrial Arts	0.0	14.1	
Music	0.0	5.5	
Foreign Languages	0.0	3.1	
ESL	0.0	2.3	
Physical Education	0.0	1.6	

TABLE 4

Most Common Uses of Computers

	% of schools using	
	Elementary	Secondary
Drill and Practice	93.6	75.0 #4
Instructional games	74.5	71.1 #5
Reward or leisure activity	66.0	69.5
To teach content	46.8	61.7
To teach computer operation	40.4	87.5 #1
To teach problem solving	36.2	70.3
To teach word processing	19.2	82.8 #3
To run simulations	8.5	42.2
To teach programming	8.5	83.6 #2
To teach computer history	2.1	67.2
To teach role and impact of computer in society	0.0	63.3
To teach data processing	0.0	62.5
To teach about computer careers	0.0	49.2